of calculating this information has yet been determined. Accordingly, it is premature for the Commission to adopt a specific standard at this time.

Using current technology, the information proposed to be required in the second stage of the Commission's ALI implementation schedule will most likely be calculated by signal measurements received by multiple cell sites or by an independently deployed location system. GTE believes that, in a multiple base station environment, a position estimate can be derived using one of several triangulation algorithms. The accuracy of these triangulation algorithms, however, is the subject of intensive investigation throughout the wireless industry. No "best system" has yet been identified.

Moreover, in order to perform any of the possible triangulation methods, extensive infrastructure upgrades must be made to wireless networks, including:

- the network must provide coverage to any single geospatial coordinate within a served zone;
- the network must be capable of transporting signal measurements to a centralized processing location -- which does not exist today;
- the network must be capable of deriving location information from whatever signal (AMPS, TDMA, CDMA) is used in the network;
- the network must be capable of synchronizing delivery of the voice call with delivery of the location estimate to the PSAP; and
- the system must be tested extensively in various environments to understand the multipath effects on estimation and to better assess reliability.

The accuracy of the types of systems contemplated above would depend on a number of factors, including: the methodology adopted by hardware and software manufacturers; the availability of multiple cell sites (the triangulation

method cannot work in areas where the signal is only received by one cell site); the presence of signal obstructions, and other factors over which the wireless provider has no control.

For these reasons, GTE proposes that the Commission not impose its stage two requirement until manufacturers and wireless providers agree that such a requirement is feasible. Once a requirement is imposed, GTE suggests that wireless providers be required only to forward location information on a "best effort" basis. The Commission should make clear that carriers are making location estimates and should not be held liable for errors in the estimates made by the system.

c. Stage Three

In the third stage, the Commission proposes to require, within five years of the order, that the mobile station be capable of being located in a three dimensional environment within a radius of no more than 125 meters. The FCC also suggests that more precise information might be needed in urban environments, while only two-dimensional information may be needed in rural areas.[28] While GTE believes that carriers and manufacturers of location technology should continue to work towards developing a cost-effective location system that is capable of locating the mobile unit within the stage three parameters, it is premature to consider adopting such a requirement at this time.

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[28] *Id.* at 25.

The Commission's desire to adopt a stage three requirement appears to be fueled largely by report submitted by the Association of Public Safety Communications Officials International, Inc. ("APCO").[29] As the Commission noted, the report surveys eighteen potential location systems being developed for use in providing ALI for enhanced 911 service. Generally, most of systems surveyed are in the development stage.[30] While some of these systems may be ready for deployment in five years, at this time, neither the Commission, the industry, nor the manufacturers can say with any certainty that any of the surveyed systems will be able to be efficiently integrated into a provider's network and deliver accurate location information within the Commission's parameters in the proposed time frame. Even where a system has been substantially developed, GTE is aware of no system that has been deployed in a wireless network.[31] Also, many systems rely on technology that, even when ready for deployment, may have substantial trouble delivering performance results in particular environments.[32] Vendors appear to be even further away

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[29] C.J. Driscoll and Associates, Survey of Location Technologies to Support Mobile 911, July 1994 (survey conducted for APCO and for the State of California Department of General Services Telecommunications Division, copy on file in this docket) (*"Driscoll Report"*).

[30] *See, e.g., Driscoll Report* at 15-16 (Associated Communications Corporation System); 43-44 (Terrapin Corporation system); 51-52 (Galaxy Systems, Inc.); 54 (Airtouch Teletrac system).

[31] *See, e.g. Driscoll Report* at 12-13 (KSI, Inc. system).

[32] For example, systems relying on GPS technology depend on line-of-sight transmission and may not be dependable in urban situations. *See, e.g., Driscoll Report* at 43-45 (Terrapin Corporation system); 46-48 (NAVSYS Corporation system).

from developing an economical system for providing altitude or building floor information.[33]

Thus, a close inspection of the *Driscoll Report* would seem to indicate that there is a great deal of uncertainty regarding whether the systems surveyed will be capable of delivering location information by a time certain in the future. Accordingly, GTE believes that it is too soon to adopt the Commission's stage three ALI parameters. Indeed, a similar conclusion was also reached recently by the Emergency Services "Joint Experts." After reviewing location technologies including those surveyed in the *Driscoll Report*, the Joint Experts stated that "[e]stablishment of definitive minimum requirements at this time may be premature."[34] The Joint Experts also added that "[p]erformance analysis of the location technologies for various architectures and operating environments will require additional development and testing."[35]

Incomplete development is not the only barrier standing in the way of the implementation of advanced ALI technology in wireless networks. Cost is another issue that must be considered. Each of location technologies surveyed

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[33] For example, some companies state that altitude information could be computed if a base station were placed on each building floor. *See Driscoll Report* at 50 (Smith Advanced Technology, Inc. system). Others state that they will be able to provide floor/altitude information if a micro-cell were located in the building. *Id.* at 13 (KSI, Inc. system). Many of the systems merely reported that performance is degraded in urban environments without discussing the system ability to deliver altitude/floor information.

[34] *Joint Experts November Report* at 26.

[35] *Id.* at 40.

would require a handset modification, additional network infrastructure, or both.[36] Yet, conspicuous in its absence in the NPRM is the lack of any detailed discussion or analysis regarding the cost of implementation of location technology.[37] GTE strongly believes that the Commission must consider the costs issues associated with implementing performance standards as compared to the benefit received prior to adopting the standard.

Finally, as stated in the previous subsection, GTE is concerned with the accuracy requirements envisioned by the Commission. GTE believes that wireless carriers should not be held accountable for errors in the location information provided to the PSAP. At most, any Commission standard adopted should only require carriers to provide the "best information available."

Accordingly, GTE urges the Commission to refrain from adopting its stage three ALI performance standard at this time. In lieu of adopting the stage three standard, GTE proposes that the Commission require wireless carriers to work as a group with vendors towards development of a location system that will provide more accurate location information. The Commission should require yearly reports from such group until a solution or several possible solutions are

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[36] Without specific details and extensive testing of the various location methods discussed in the *Driscoll Report*, GTE cannot provide any reasonable estimate of the costs associated with implementing these systems.

[37] While the Commission does mention that the technologies surveyed in the *Driscoll Report* would cost between $3 and $300 to retrofit an existing handset and between $10,000 and $40,000 per base station for systems involving network-based solutions, nowhere does the Commission seek comment on the reasonableness of such costs or on the issue of cost recovery. *See NPRM* at 23.

available. The Commission could then base future ALI requirements on the reports received.

In summary, GTE believes that the Commission should limit any ALI performance standards to a requirement that existing technology will allow the industry to meet in the specified time. Such standards should not require the carrier to guaranty accuracy, but rather should require delivery of the "best information available." No standard should be adopted before cost issues are considered. Also, because it does not appear that any company is close to developing a cost-effective altitude location system, any Commission ALI standard adopted in the upcoming order should focus entirely on two-dimensions. In lieu of a stage three requirement, the Commission should require the industry to work with vendors towards developing systems capable of providing better location information.

7. Re-ring/Call Back

The FCC proposes to require, within three years, that wireless systems provide PSAP attendants with the capability to immediately call back the 911 caller if the call is disconnected. The Commission proposes to require that the PSAP receive the 10 digit ANI and an indication that the call comes from a mobile unit. The Commission also suggests that ideally this feature will provide for the return call from the PSAP to be connected directly to the mobile unit that originated the call.[38]

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[38] *NRPM* at 25-26.

As discussed earlier, existing technology permits the caller's number (ANI) to be transmitted to the PSAP, enabling the PSAP to call back in the event of a disconnection. However, as detailed in that section, many PSAPs today only have the capability of reading the first 7 or 8 digits of an ANI. As such, the PSAP would not obtain sufficient information to enable it to call back a roamer or in the future to identify/re-ring the caller in areas where multiple NPA overlays exist. This issue needs to be addressed by the Commission.

As part of any re-ring/call back requirement, GTE suggests that the Commission consider a method by which all 911 service providers maintain a list of roamer access numbers for cellular providers in the 911 service area. This information would improve efficiency by enabling the PSAP to call back the roamer by accessing the roamer port of the serving switch, rather than requiring it to dial through the roamer's home switch. This information would also enable the PSAP to call back a roamer who has not activated the automatic roaming function for receiving calls.

GTE does not believe that it is possible in the wireless environment for the wireless switch to hold the connection so that the PSAP can be directly connected to the mobile unit that originated the call. Enhanced wireline 911 service is configured so that in the event of a disconnection, the switch will recognize the 911 call and keep an open line between the PSAP and the calling party. The re-ring/call-back feature, as implemented in the wireline environment, cannot be implemented by wireless providers. Unlike wireline service where the phone is powered from the network, wireless providers have no control over the

mobile unit's power switch or battery. Therefore wireless providers cannot ensure that the mobile unit will be able to accept the return call.

In summary, re-ring/call back will be capable on wireless service networks if wireless switches and PSAPs are upgraded so that 10-digit ANI can be transmitted and received. GTE suggests that the Commission consider a method by which all 911 providers would maintain a list of roamer access numbers in order to enable PSAPs to call back roamers through the local wireless network rather than through the roamer's home switch. Wireless networks are not capable of holding the connection between the PSAP and the caller in order to permit direct call back in the same manner as wireline networks.

8. Common Channel Signaling

In the Notice, the Commission proposes, within 3 years of the order, to require that common channel signaling capabilities be implemented. The Commission seeks comment on the reliability of 911 technology dependent on common channel signaling, in particular during a common channel signaling outage.[39]

As an initial matter, GTE urges the Commission not to specify a particular common channel signaling technology. GTE is concerned that the Commission, in the NPRM, perhaps inadvertently expressed a bias in favor of SS7. Thus, the Commission repeatedly used the term "SS7" interchangeably with the term "common channel signaling." Cellular carriers are currently working towards

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[39] *Id.* at 26-27.

implementation of common channel signaling. While some carriers have chosen to implement signaling system 7 ("SS7") technology, others are working towards implementing other forms of common channel signaling. Any Commission proposals and rules should be careful not to require, intentionally or otherwise, implementation of one specific technology over another.

Nor should the Commission adopt a common channel signaling implementation requirement at this time. Wireless providers are currently working with industry standards groups to address issues, such as interconnection and network reliability, associated with common channel signaling implementation in the wireless environment. GTE believes that industry standards groups, for the time being, are better suited to develop the standards necessary to implement common channel signaling. GTE proposes that, in lieu of adopting a specific implementation schedule for common channel signaling, the Commission should require periodic reports from industry standards work groups and base future implementation requirements on such reports.

In summary, the Commission should not specify a particular common channel signaling method that must be deployed by wireless networks. GTE urges the Commission not to adopt a common channel signaling implementation requirement at this time. The Commission should allow industry standards groups to continue to address implementation issues, but require such groups to make periodic reports to the FCC.

9. Access to Text Telephone Devices

The Commission proposes, within one year of the order, to require that radio services be capable of permitting access by individuals with hearing or speech impairments through means such as TTY devices. The Commission seeks comment on how to ensure access to 911 services by persons using such devices and on the related cost and feasibility issues.[40]

GTE currently provides cellular circuit switched data service. Through this service, TTY devices can continue to be utilized in GTE's networks for 911 emergency communications.

In summary, GTE supports the Commission's proposal to require wireless compatibility with text telephone devices for the purposes of placing 911 calls.

10. Technology

The Commission seeks comment as to whether, in order to implement some of proposals set forth in the Notice, it is necessary to establish specific requirements for base station and mobile transmitters. In particular, the Commission seeks comment on whether such requirements are necessary to ensure compliance with the ANI and ALI proposals, and on whether the ANI and ALI proposals require technology to be placed in the mobile unit transmitter.[41]

GTE strongly discourages the Commission from adopting a policy that would require existing mobile transmitters to be retrofitted in any way. As a

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[40] *Id.* at 27.

[41] *Id.* at 27-28.

general matter, it is more economical and less burdensome for service providers to implement technological changes and upgrades through network infrastructure modifications rather than mobile unit solutions. GTE anticipates that the cost of retrofitting mobile transmitters would be excessive by comparison. Handset solutions would also create administrative difficulties associated with recalling handsets to perform the retrofit, and the likelihood that some customers will opt not to have their handsets upgraded and therefore will not be able to take advantage of enhanced 911 features.

Moreover, handset solutions place existing networks at a disadvantage relative to providers of new mobile services like PCS and wide-area SMR. Start-up mobile services providers that either have not yet begun to implement service or are still building a customer base would have a much easier time complying with handset requirements than existing cellular providers. Because these systems have not yet begun to operate, or have a relatively small existing customer base, such systems could implement a handset requirement by developing handset manufacturing specifications that are consistent with the new requirements. By contrast, cellular providers have a large existing customer base. Most cellular customers own handsets that would become obsolete under the new standards if not retrofitted. As noted above, any handset solution would be difficult and costly to implement.

While GTE opposes Commission-mandated handset requirements, nothing should prevent developers of handset-based methods of providing special enhancements to 911 service from offering those products on the market

or to niche markets. Customers that desire such services and are willing to pay for the handset upgrade should not be prevented from purchasing these special enhanced 911 capabilities.

In summary, GTE opposes any requirement that would implement enhanced 911 capabilities by means of a mobile unit retrofit. Handset-based solutions would be costly and would place existing networks and their customers at a disadvantage as compared with new networks. GTE would not be opposed to individual manufacturers or providers offering special 911 service enhancements that require handset upgrades to customers willing to pay for such services.

11. Preemption

The Commission stated in the NPRM that it believed it had authority to impose uniform requirements on the provision of 911 services. The FCC suggested that it would preempt states from adopting (or maintaining) conflicting standards.[42] GTE supports FCC preemption of inconsistent state 911 compatibility requirements.

GTE believes that preemption of potentially inconsistent state regulation is necessary in the area of 911 compatibility regulations. Public safety will be better served if there is a national standard for 911 service that citizens can rely on no matter where they are situated. Users should be able to make 911

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[42] Thus, the Commission asked for comment on any potential conflict between its proposed rules and existing state regulations and asked commenters opposing preemption to suggest specific alternatives for ensuring that inconsistent requirements do not thwart the nationwide goal of achieving compatibility with enhanced 911 systems. *NPRM* at 29.

emergency calls on a national basis and know that the service has all the features mandated by the Federal Communications Commission. Preemption is also necessary to relieve service providers from the burden of complying with varying state regulatory requirements. Regulatory compliance under these circumstances would be particularly troublesome for companies with service areas that cross state boundaries.

In summary, GTE supports preemption of inconsistent state 911 compatibility requirements. Preemption is necessary to ensure a uniform nationwide 911 system. Preemption is justified in order to prevent state regulations from thwarting the federal policy.

12. Cost Issues

The Commission does not discuss in the Notice the costs associated with implementing the Commission's 911 compatibility standards. Traditionally, the costs of providing 911 service are collected by LECs through surcharges approved by state regulatory commissions or through subsidy mechanisms administered by the state. Thus, any time a state mandates an improvement to emergency 911 systems, it should consider the cost of such improvements, how costs will be recovered, and what effect, if any, a resulting rate hike to pay for such improvements will have on consumers.

As noted above, the NPRM is silent on these cost issues. Much of what the Commission proposes in the Notice, even if feasible, would be costly to implement in cellular networks. In fact, GTE believes that some of the proposals pertaining to location information may be so expensive that passing such costs

through to subscribers could seriously slow the growth of wireless services. GTE believes that cost issues must be considered prior to the Commission's adopting any new 911 compatibility requirements. GTE urges the Commission to weigh the cost of any requirements against the benefits such requirements will provide before deciding to adopt the standard.

In summary, GTE urges the Commission, prior to adopting any compatibility standards for wireless 911 service, to carefully consider the costs of compliance with the standards.

III. COMPATIBILITY OF PBX EQUIPMENT WITH 911 SYSTEMS

A. INTRODUCTION

Out of a concern "that the incompatibility of PBXs with enhanced 911 systems is hampering public safety access through the public switched network,"[43] the Commission proposes to require compatibility of PBX equipment with 911 systems.[44] GTE agrees that PBX systems should not constitute a weak link in the chain of E911 services; however, GTE urges the Commission to adopt a balanced, flexible approach in its effort to address this issue. Because the telecommunications needs of multi-line telephone system ("MLTS") owners vary greatly from one to another, the technological sophistication of existing MLTS equipment also varies greatly. Some small systems in use pre-date semiconductor technology while other larger systems have state-of-the-art

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[43] *Id.* at 11.

[44] *Id.*

capabilities. Thus, what may be an insignificant cost of compliance for one user may be cost prohibitive for another.[45] In this environment, a one-rule-fits-all approach is simply untenable.

B. DISCUSSION

1. Wireless PBXs

The Commission should allow the nascent and relatively small wireless PBX market sufficient time to develop the basic technology needed to provide this service at competitive prices before making location information a non-optional feature. In the interim, labeling of equipment and customer education should be required to make the 911 limitations of wireless PBXs clear. GTE -- as well as many other firms -- currently requires wireless PBX customers, as part of the sales agreement, to acknowle their understanding that the wireless stations are not equipped to provide location information to E911 PSAPs and that the equipment should not be used for such emergency communications.

2. PBXs At Physically Small Locations

MLTS stations in physically small locations do not present nearly as difficult a location identification problem as do larger facilities.[46] At these locations, all MLTS stations might be on the same floor or even in the same room. For this reason, GTE proposes that MLTS customers with less than 15

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[45] In this regard, new wireless PBX manufacturers are still struggling to reduce costs so as to make the cost of mobility more feasible to a larger number of PBX users. For these manufacturers, the potential cost of heavy-handed regulations could have a dramatic impact on their ability to meaningfully compete with wireline manufacturers in the future.

[46] *See NPRM* at 12.

stations be given added flexibility in complying with Commission rules. Thus, for example, these customers might be deemed in compliance if they specially label each station with instructions on the location information to be given in the event of a 911 call.

3. Transmission of Database Information by PBX Owners to Local Exchange Carriers

The Commission proposes "to require coordination procedures to ensure accurate and timely transmission of database information by PBX owners to local exchange carriers."[47] While the maintenance of current database information is unquestionably critical to an effective 911 system, the proposed rule falls short of ensuring that the required maintenance is timely. Although proposed Section 68.228(d) requires the "installation supervisor" to notify the telephone company that the verification tests have been performed and to provide it with other key information, it does not specify *when* this must be done. Similarly, although subsection (e) requires that a verification of operation take place whenever entries are added to or deleted from the database, it fails to specify how soon after the change(s) the verification must take place. Thus, as currently worded, the effectiveness of the rule will be directly related to the efficiency/conscientiousness (or lack thereof) of the "installation supervisor." Consequently, GTE urges the Commission to set more concise triggers for the verification and reporting obligations of this rule.

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[47] *Id.* at 13.

4. GTE Supports the Use of NANP Numbers for the Identification of PBX Calling Station

As noted by the Commission, GTE previously identified the need to examine whether all MLTS stations would require a DID-like number or whether an "index" or some other numbering indentification could be used.[48] GTE raised the concern because of them North American Numbering Plan ("NANP") number exhaust problem then existing. Since then, interchangeable NPA codes have been introduced as a way of alleviating the number exhaust problem. Consequently, GTE believes that the costs and potential confusion associated with artificial station number identifications are now more worrisome than the use of NANP numbers.

The use of artificial numbers for those customers not subscribing to Direct Inward Dialing ("DID") would require a standard that could not be confused with existing NANP numbers. With the trend toward consolidating database information for very large portions of serving areas, maintaining two numbering systems could complicate the ability to keep each number unique. By using one system -- the NANP -- confusion will be avoided as well as the costs associated with the administration of a second numbering system.[49]

Even though there may no longer be an immediate shortage of NANP numbers, careful assignment will avoid unneccsary costs associated with the introduction of new NPAs into the network.

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[48] *Id.* at 13-14.

[49] With the advent of local number portability for geographic numbers, additional issues regarding E911 services may need to be addressed.

In summary, GTE supports the goal of making PBX systems fully compatible with 911 systems. Because of the number of different systems currently in use, however, the Commission must adopt a balanced, flexible approach in addressing this issue. Wireless PBX manufacturers should be allowed sufficient time to develop the technology needed to make their service competitive with wireline manufacturers before full-blown 911 compatibility requirements are imposed on them. Similarly, flexibility should be afforded PBX owners with less than 15 stations by allowing, for example, labels at each station giving location instructions. Subject to its recommended revisions, GTE also supports the proposed rules designed to coordinate the transmission of information from PBX owners to LECs. Finally, with the introduction of interchangeable NPAs to alleviate number exhaust, GTE supports the careful use of NANP numbers to identify PBX calling stations.

Respectfully submitted,

GTE Service Corporation on behalf of
GTE's domestic telephone and wireless
service companies

By _____

Andre J. Lachance
David J. Gudino
1850 M Street, N.W.
Suite 1200
Washington, D.C. 20036
(202) 463-5276

THEIR ATTORNEYS

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